



Marshall Space Flight Center

MSFC's Role and Vision for Small Launch Vehicles

17th Space and Missile Defense Symposium

August 12, 2014

Lawanna Harris
NanoLaunch Project Manager

marshall

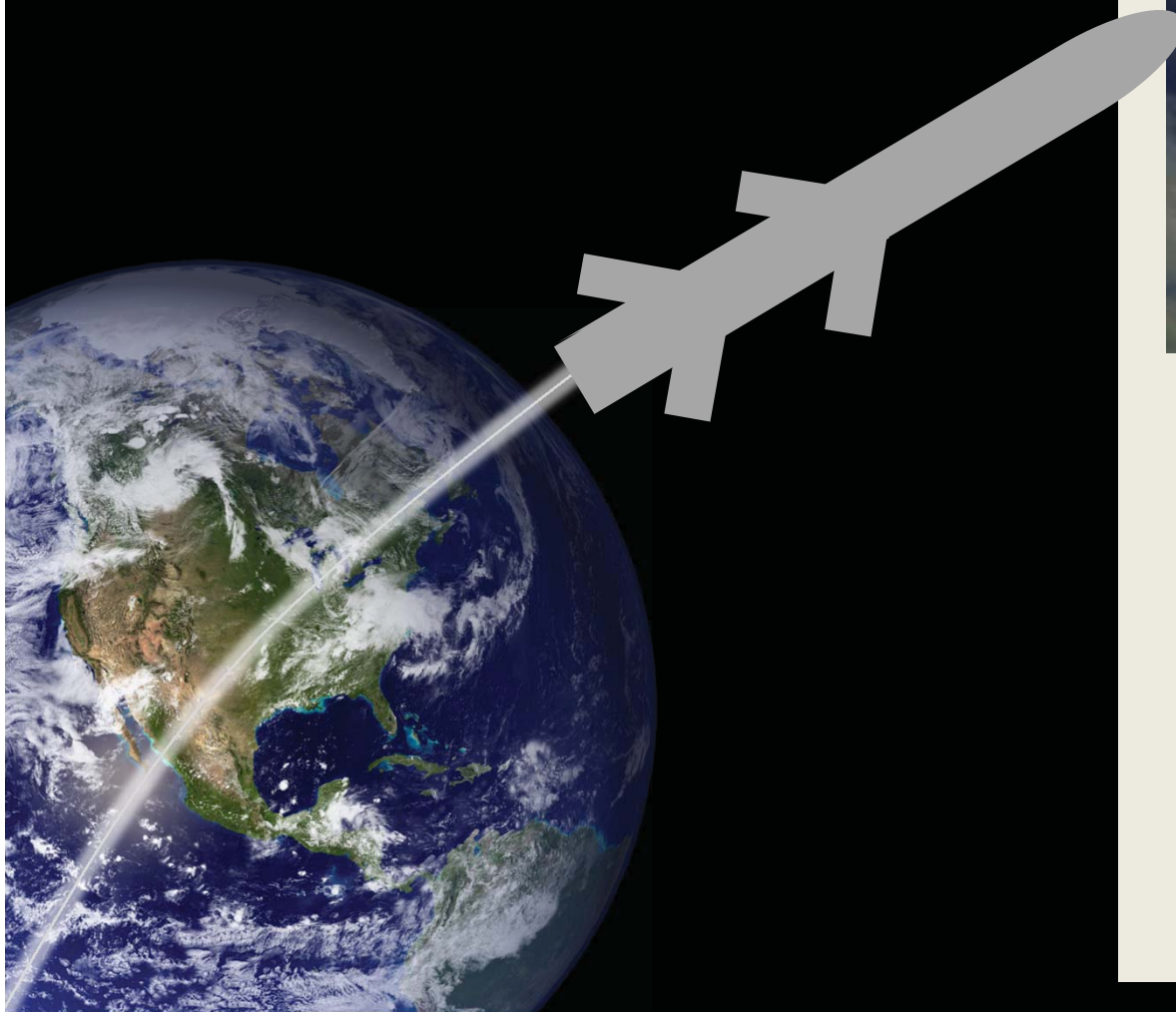


NLP

NanoLaunch Project

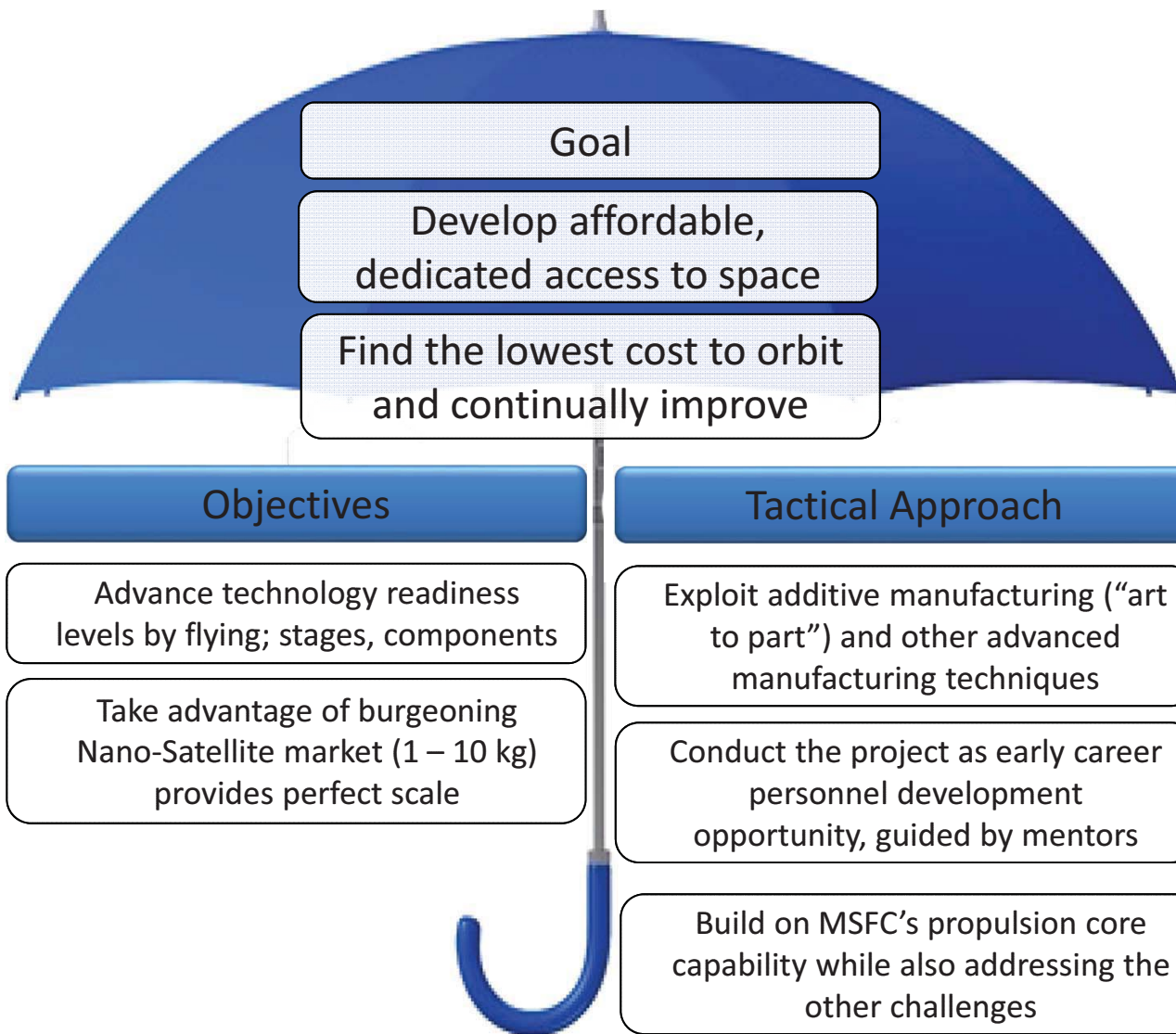
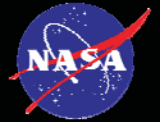
Goals and Objectives

National Aeronautics and
Space Administration



2014 Nanolaunch Flight Test



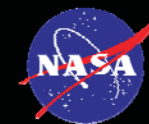


NLP

NanoLaunch Project

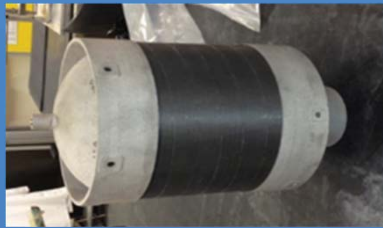
Technology Development

National Aeronautics and
Space Administration



Balancing Risk and Innovation Through Training and Collaboration

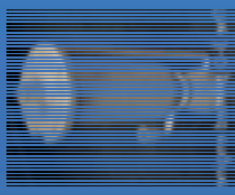
Low Cost Solid Rocket Motors



Innovative Hybrid Approaches



“Printed” Liquid Engines

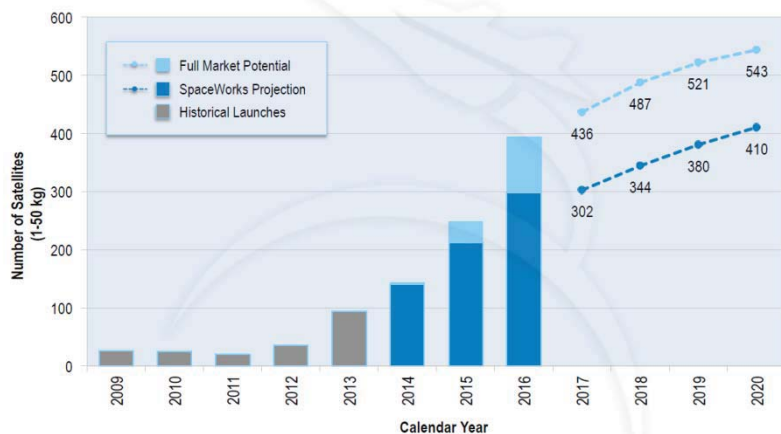


Novell Components and COTS Utilization



Nano/Microsatellite Launch History and Projection (1 - 50 kg)

Projections based on announced and future plans of developers and programs indicate between 2,000 and 2,750 nano/microsatellites will require a launch from 2014 through 2020

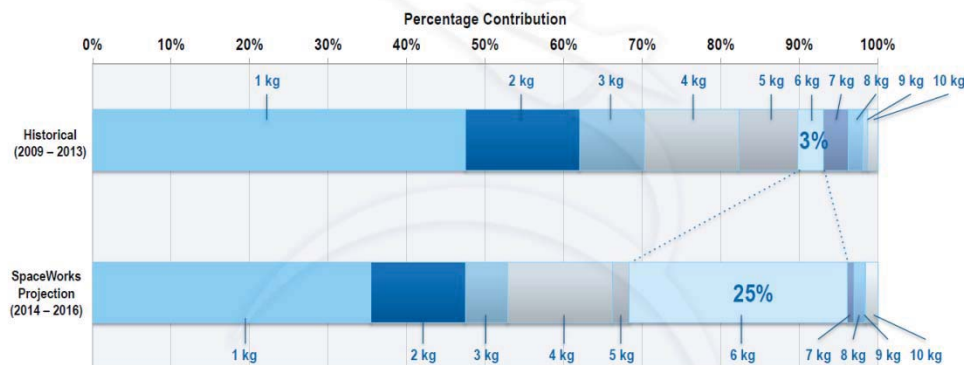


The Full Market Potential dataset is a combination of publically announced launch intentions, market research, and qualitative/quantitative assessments to account for future activities and programs. The SpaceWorks Projection dataset reflects SpaceWorks' expert value judgment on the likely market outcome.

Significant growth in both the quantity and quality of cubesat missions.

Nanosatellite Size Trends (1 - 10 kg)

1U (1 kg) CubeSats, while still immensely popular, will comprise less of the market in the future (35% of future nanosatellites compared to 47% from 2009 to 2013)



25% of future nanosatellites (1-10 kg) are in the increasingly popular 6 kg mass class (compared to only 3% from 2009 to 2013)

Picture from the surface of the earth with optics that will fit within a 3U cubesat.

Ved Chirayath, Stanford University

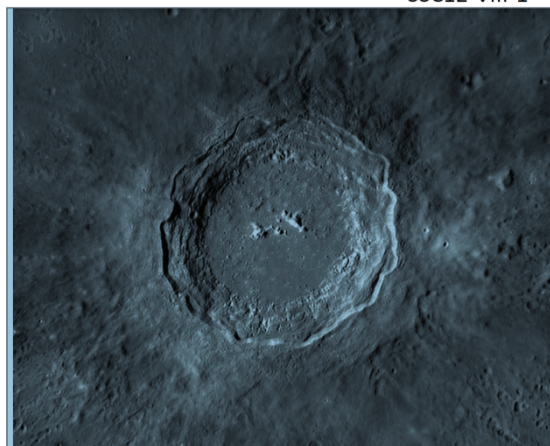


Figure 9 – Lunar detail (Copernicus Crater, 93 km diameter)

* Please see End Notes 2, 6, 7, and 9.

Best solution is “out there,”
so fly early and often:

- Initial orbital capability: MSFC developed stages atop sounding rocket - 5 kg to ~200 km circular
- Validate candidate technologies with affordable sub-orbital flights
- Plan and pursue eventual stage upgrades enabling affordable orbital capability

“Co-opetition” and maturing
technology spinoff

- Off-the-shelf Avionics: Ames CNAT vs. MSFC vs. KSC vs. ?
- Each development step contains technologies for a launch services provider to exploit

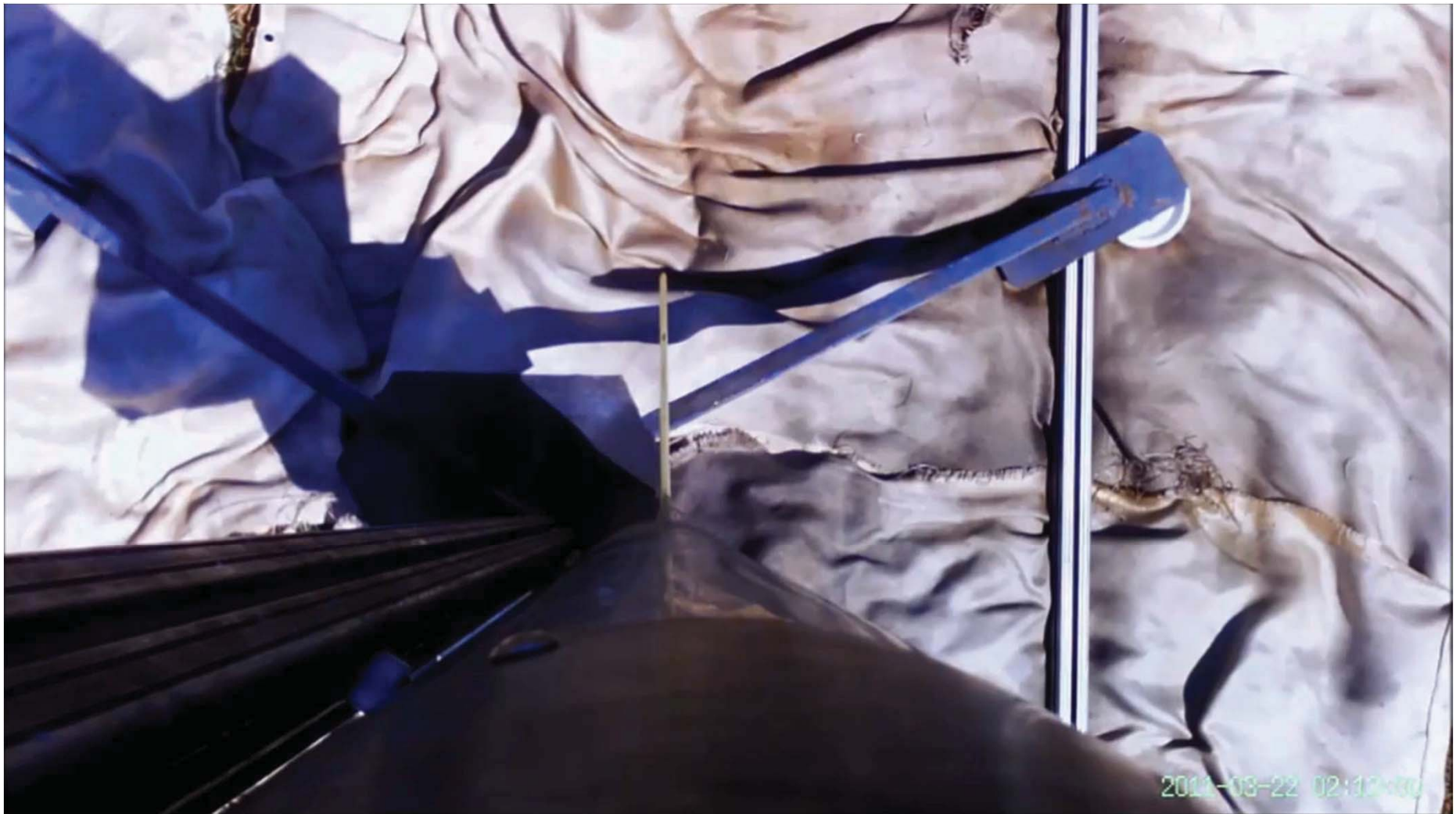
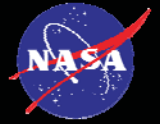


NLP

NanoLaunch Project

Flight Test

National Aeronautics and
Space Administration

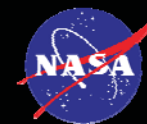


NLP

NanoLaunch Project

Schedule

National Aeronautics and
Space Administration

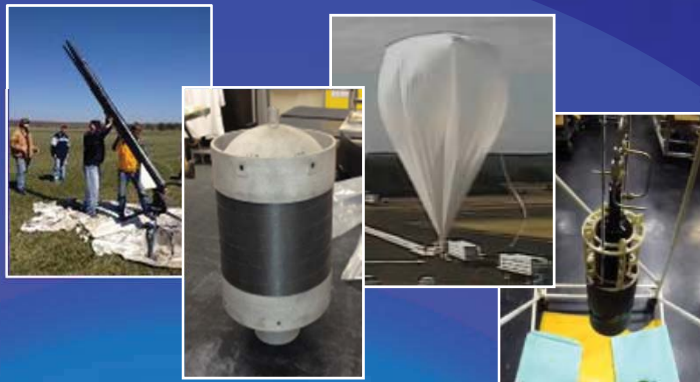


FY14

FY15

FY16

Orbital Capability



NL2A:
Feb '15



25,000ft
Component test

50,000ft
Subsystem test

Sub-Orbital

Orbital

